E/CONF.39/C/441
SUMMARY
2 Nov.1962
ORIGINAL : ENGLISH

UNITED NATIONS CONFERENCE
ON THE APPLICATION OF SCIENCE AND TECHNOLOGY
FOR THE BENEFIT OF THE LESS DEVELOPED AREAS

SUMMARY

Agenda Item: C.5.2

United States of America

ANIMAL IMPROVEMENT AND ADAPTATION

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ANIMAL IMPROVEMENT AND ADAPTATION

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1. The first step in any animal improvement program is to describe clearly the characteristics of the ideal animal for the particular region or country concerned, giving due consideration to the nutritional, cultural and other needs of the people. Then, the greatest attention should be given to obtaining direct and simple measurements of productivity, with only minor emphasis on the "sign characters" which might indicate productivity but only indirectly. An individual animal's genetic merit (or breeding value) can be estimated more accurately by considering also the merit of its ancestors, collateral relatives and progeny, and by allowing for the effects of non-standard environment of the individual's own performance, than by judging that animal entirely on its own appearance and apparent performance.

2. Improvement by breeding can follow two somewhat divergent roads. The first and simplest is to select those animals which are best genetically and to use them as extensively as possible for breeding, and to cull, at every opportunity, those which are worst genetically. The first method is aimed at producing a stock which is as good as, or better than, any cross which could be made from it. The second road leads towards relatively pure seedstocks which are mediocre themselves but which will cross with each other to produce better animals for use than any pure stock can be. This second road is advantageous when heterosis is extreme but it may require too much record keeping, too much separation of stocks, and too many other complications to be practical in the less well developed countries. However, it is now the standard practice of maize breeders and of many breeders of poultry. Crisscrossing with two distinct native stocks or with an imported stock and a native stock, is the simplestcontinuing way of following this road with animals. Rotation cross-breeding with three or more such stocks will capture somewhat more of the heterosis but is more complicated.

3. A first step in seeking the most suitable foundation stock is to visit all the farms where native stock has been improved by local breeders. If even a few of these have already improved their animals distinctly, it is an indication that the local stock almost surely contains many other advantageous but hidden qualities.

4. An imported breed is rarely suited perfectly to the local needs. It is common practice to "grade" or breed successive generations of a herd to sires of an improved breed. However, before grading the native stock far toward an imported breed, one should ascertain whether the locally produced purebred females of the imported breed are well adapted. If the purebreds are ill-adapted in any important respects, grading the native stock toward the imported one should generally not proceed further than the first or second cross. Testing the adaptability of an imported stock, when bred pure, costs both time and money. Therefore, it would be

advisable to visit the herds of exotic breeds already in production in countries with similar environments before proceeding with this type of program.

5. If crosses of an imported stock on the native animals are better than the native stock, the cause could be either (1) heterosis or (2) the imported stock is itself intrinsically adapted to that country. It is important to determine as early as possible which of these explains the merit of the first cross. If heterosis is the cause, grading toward the imported stock should not go much further than the first cross. The native stock may have contributed as much to the heterosis as the imported stock. If the first crosses are backcrossed to the imported stock, the 3/4 imported stock which result will have only about one-fourth as much temporary heterosis as the first crosses had and they will also lose much of the local adaptability which the native stock contributed. If, however, heterosis is small and yet the first crosses are superior to the native stock, grading at least one more generation toward the imported stock seems advisable.

6. If each of two or more stocks has different qualities, which are highly advantageous locally and yet heterosis is not extreme, combining these into a single breed may be advisable, although that will require much time. All of the temporary heterosis will disappear in the first generation produced by mating together males and females with the same percentage of blood. One should be prepared for this. The genetic base should be kept reasonably broad at all times. This requires using in each generation a large enough number of sires to ensure that the inbreeding will not rise rapidly.

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